PN Monitoring

Mallorca, October 2006
Hot Pixels

Number of Hot Pixels ($E > 744$ ADU)

Legend:
- User Events
- Solar Flares
- Eclipse Seasons
- BPT updates (approx.)

Total in blue
Non-uploaded in red
Noisy Pixels

Introduction

FF 50-Iteration Offset
Noisy Pixels

Number of Noisy Pixels (f >= 1 %)

User Events

BPT update (approx.)
Noisy Pixels and Telemetry Load

Fraction of counts due to Noisy Pixels Per Quadrant

Rev 156 Impact
Noisy Pixels and Telemetry Load

Fraction of counts due to Noisy Pixels
Per CCD of Quadrant 3

Should we blank CCD 11 Column 63 (at least partially)???
Some very hot pixels are not flagged by standard use of `epproc / epchain`:

- `epproc/epchain` call `badpixfind` with default high energy threshold of 12 keV (parameter `hienergythresh=12`)

Combination of noisy and very hot pixels (E > 12 keV) results in problems with flare screening GTI creation (at least when following the EPIC analysis threads):

- b/g rate curve selection expression:
  `#XMMEA_EP && (PATTERN==0) && (PI>10000)`

- so very hot pixels are “missed”, and if these happen to be noisy…
Hot + Noisy Pixels: Effects on Data Reduction

Background Rate Curve for Flare Screening

![Graph showing background rate curve with standard and threshold levels]

- **Standard Background**
- **Background Excluding Bad Pix**
- **Standard Threshold**

**Rate [c/s]**

**Time**
Hot + Noisy Pixels: Effects on Data Reduction

Hot Pixel Energy Trend

Hot & Noisy Pixel in CCD 11 Column 63

Offset Trend

Frequency Trend

Hot Pixel Threshold

Michael Smith, ESAC
For flare screening the solution could be to create the b/g curve in 10 - 12 keV band:

```
#XMMEA_EP && (PATTERN==0) && (PI>10000) && (PI<12000)
```

with a suitably adapted threshold (0.4 counts/s)

>10 keV and 10-12 keV rates are highly correlated

This is an incomplete solution: The bad pixels remain in the calibrated events file!
Offset Median

Offset Map Median
Offset Maps

Normal Variance  Excessive Variance
Mean Row Offset vs RAWY
Normal Variance
Mean Row Offset vs RAWY
Excessive Q0 & Q2 Variance
Mean Row Offset vs RAWY
Excessive Q1 & Q3 Variance
CalClosed Line Widths vs Offset Map Variance

Quadrant 0

Quadrant 1

Quadrate 0 Line Widths vs CCD3 Offset Variance [ADU]

Quadrate 1 Line Widths vs CCD6 Offset Variance [ADU]
Energy Scale vs Time very good, esp. for FF mode.

Slight over-correction for EFF mode.

SW mode under-correction, esp. at Mn

(Result of SAS 6.5 Processing)
Line width trend is stable
~0.5 ADU/year increase at Mn
(Result of SAS 6.5 Processing)
MOS Monitoring

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